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Report of the Secretary-General

Summary

With enough food produced in the world, more than 850 million people still suffer from chronic hunger. Despite a decline in rural poverty over the past 10 years, still there are an estimated 883 million rural poor, the vast majority of whom depend on agriculture for their survival and livelihoods. With global population projected to grow to 9 billion people by 2050, mostly in the developing world, food production will have to expand, perhaps even double, to meet growing world demand.

At the same time, new uncertainties and factors such as climate change, high energy prices and resource scarcities, along with globalization, urbanization and changing consumption and market trends, including the new surge in world agricultural prices, increase the challenges faced by agriculture. In all these efforts, the role of farmers and other rural stakeholders is critical.

It is therefore timely that attention is turning again to the role of agriculture as a crucial sector in national, regional and international efforts to reduce hunger and poverty, to improve rural livelihoods and to achieve sustainable development.

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I. Introduction

1. The present report provides a brief review of the state of implementation of the goals and targets related to agriculture agreed upon in Agenda 21, the Programme for the Further Implementation of Agenda 21, the Johannesburg Plan of Implementation of the World Summit on Sustainable Development, and relevant decisions of previous sessions of the Commission on Sustainable Development. It also highlights constraints and obstacles that countries have encountered in the implementation of these goals and targets, and reflects continuing challenges in the implementation process. In accordance with the mandate of the Commission on Sustainable Development at its eleventh session, progress in the thematic cluster of agriculture is also seen with respect to the cross-cutting issues identified by the Commission. This report should be read in conjunction with the separate reports of the Secretary-General on rural development, land, drought, desertification and Africa, as well as the report on trends in sustainable development, which are also before the Commission at its current session.

2. The report draws on substantive contributions from the Food and Agriculture Organization of the United Nations (FAO), which is the lead agency in the United Nations system for agricultural issues. The Secretariat also benefited, in particular, from the World Bank's *World Development Report, 2008: Agriculture for Development*, as well as country and national assessments submitted by Governments and inputs from stakeholders and major groups. Regional assessments prepared by the United Nations regional commissions have also been reflected.

II. Review of implementation

3. Fifteen years ago, chapter 14 of Agenda 21, which was adopted by the United Nations Conference on Environment and Development, noted that agriculture had to meet the challenge of feeding the growing number of hungry people, mainly by increasing production on land already in use and by avoiding further encroachment on land that is only marginally suitable for cultivation. Five years later, at the Earth Summit + 5, Governments called for sustainable food security, meaning adequate food availability, access and use, for both the urban and rural poor to be a policy priority. The third and eighth sessions of the Commission on Sustainable Development, in 1995 and 2000, respectively, focused on agriculture, rural development and land, and determined that agriculture must increase food production in a sustainable way and enhance food security in an environmentally sound way so as to contribute to sustainable natural resource management. The Johannesburg Plan of Implementation adopted by the World Summit on Sustainable Development in 2002 reaffirmed all these objectives and called for the implementation of the World Food Summit and Millennium Declaration goals to halve global hunger and poverty by 2015.[1] But, midway to this target year, although food security is a policy priority for all countries, it remains an unfulfilled goal. While there is generally enough food in the world to feed everyone, chronic hunger persists and future global food security faces the uncertainties of growing resource scarcities and climate change.

[1] Agenda 21 (para 14.1), Rio+5 (para. 63); CSD-8, dec. 8/4, para. 2 ...; JPOI, para. 40; FAO, *Report of the World Food Summit (13-17 November 1996)*, Rome, 1997.

A. Hunger, poverty and food security

4. Despite continuing progress in global agricultural production (including fisheries and forestry), and lower-than-projected population growth rates, an estimated 854 million people in the world still suffer from chronic hunger. Of these, 820 million live in developing countries, 25 million live in transition countries and 9 million are in the developed countries. After a slight decline in the number of hungry people in the 1990s, the figure has been increasing since the beginning of this decade, making achievement of the World Food Summit target of reducing by half the number of undernourished people by 2015 increasingly unlikely.[2]

5. Because of population growth, the very small net decrease in the number of undernourished people since the 1990-1992 baseline period has resulted in a reduction in the proportion of the hungry in developing countries by 3 percentage points — from 20 per cent in 1990-1992 to 17 per cent in 2002-2004 (the latest global estimates from FAO). This means that progress has been made towards meeting the target of the first Millennium Development Goal of halving the percentage of hungry people by 2015. However, progress over this period was slower than over the previous two decades, when the prevalence of undernourishment declined by 9 percentage points (from 37 to 28 per cent) between 1969-1971 and 1979-1981 and by a further 8 percentage points (to 20 per cent) between 1979-1981 and 1990-1992.

6. Global stagnation in hunger reduction masks significant disparities among regions: Asia and the Pacific and Latin America and the Caribbean have seen an overall reduction in both the number and prevalence of undernourished people since 1990-1992. Nevertheless, in both regions, the average rate of reduction has fallen short of what would be required to halve the undernourished population by 2015. While economic growth in East Asia, especially China, has helped reduce the incidence of undernourishment in this region by an average of 2.5 per cent a year, South Asia contains the largest number of hungry people, accounting for 36 per cent of all undernourished people in the developing world. In the Near East, North Africa and in sub-Saharan Africa, the number of undernourished people has risen over the same 1990-1992 to 2002-2004 period. In sub-Saharan Africa, this represents the continuation of a trend that has been apparent over the last three decades at least. In Central Africa, there has been a dramatic increase in both the number and prevalence of undernourishment.[3]

7. As often noted, the problems of hunger and poverty are inextricably linked and one cannot be solved without tackling the other. Hunger is not only a consequence but also a cause of poverty. Yet past trends and projections suggest that poverty reduction does not necessarily lessen undernourishment, especially for the most vulnerable, as chronic hunger itself acts as a barrier to escaping poverty, the so-called "hunger trap".

8. Nevertheless, agriculture does have a proven comparative advantage over other sectors in reducing poverty. Farmers engage in agriculture both as a means to feed themselves and their families and to earn a living by selling its products. Agricultural growth is the main contributor to food security as well as to poverty

[2] FAO, The State of Food and Agriculture (SOFA), 2007. Rome, 2007.

[3] Ibid., pp. 130-133, Figures 26-27; FAO, The State of Food Insecurity in the World, Rome, 2006; and World Bank, World Development Indicators, 2007.

reduction and overall development, especially in the developing countries. But, after 50 years of nearly continuous growth in world agricultural production, this success still eludes many countries, especially the least developed countries, particularly in recent years, and environmental costs have often been high, threatening the sustainability of future production. As pointed out in the World Bank's *World Development Report 2008*, the irony is that most of the food insecure live in rural areas where food is produced, yet they are net food buyers rather than sellers. Poverty constrains their access to food in the marketplace.[4]

9. An overriding consideration affecting agricultural development is the fact that women are the main producers of the world's staple crops (rice, wheat and maize). According to FAO, rural women are responsible for half of the world's food production and produce between 60-80 per cent of the food in most developing countries. In Africa, in particular, as men's participation in agriculture has declined as a result of war, sickness and death from HIV/AIDS and other diseases, and rural-urban migration of men in search of paid employment, the role of women in agriculture has become increasingly dominant, a phenomenon termed the "feminization of agriculture". The fact that women tend to have less access to agricultural inputs and services, land, tools and technology, rural credit, farmers' extension training and participation in decision-making limits the opportunities for overall growth in the agricultural sector.

B. Agricultural production and consumption

1. Sectoral trends and forecasts

10. Globally, total agricultural production has met the world's growing demand for food (including crops and livestock products). The total gross domestic product (GDP) of agriculture expanded from 1980 to 2005 by an average of 2.0 per cent a year, which is above the population growth rate of 1.6 per cent annually. Production per capita has consequently trended upward, especially since the mid-1990s. Much of this production growth has been in developing countries.

11. Production and demand for individual agricultural commodities has fluctuated over time and growth has not always been uniform. According to FAO data, world cereal production, after several years of stagnation, increased sharply in the 2004-2005 crop year, but declined in 2006-2007, largely due to unfavourable weather conditions in some major producing countries. World cereal production in 2007 is estimated to have increased by 4.6 per cent over the previous year and early prospects for 2008 indicate a larger gain, as a result of expanded winter grain plantings in Europe and the United States. While drought and flooding in different parts of the world limited growth prospects for rice and wheat in 2007, production and consumption of coarse grains, especially maize and sorghum, are forecast to have grown substantially because of the demand for animal feed as well as for the manufacture of ethanol. The production of high-value agricultural commodities such

[4] World Bank, *World Development Report, 2008: Agriculture for Development* (Washington, D.C., 2007).

as vegetables, fruits, meat, milk and flowers is growing at a substantially higher rate in developing countries than in developed countries.[5]

12. Livestock production currently accounts for some 40 per cent of the gross value of world agricultural production, and its share is rising. This sector is the world's largest user of agricultural land, directly as pasture and indirectly through the production of fodder crops and other feedstuffs. The rate of growth of global livestock production has slowed in recent years, however, and is below the averages of the last four decades. The slowing rate of growth in livestock output has been caused by rising feed costs and various animal disease outbreaks, including avian influenza and pig and bovine diseases, causing consumer fears, trade bans and price declines. Demand for livestock products in developing countries has continued to grow along with rising incomes, bolstering the global market. In developed countries, the scope for increased demand for meat is limited, as meat consumption is already very high and health and food safety concerns, focused on animal fats and the incidence of new animal diseases, have emerged. Moreover, the impact of livestock production on the environment is a continuing concern in many countries, where it contributes to deforestation and can cause soil erosion, desertification and the loss of plant biodiversity.[6]

13. Aquaculture — or fish farming — has been the world's fastest-growing food production sector for the past 25 years, averaging an annual growth rate of 8.8 per cent since 1970. Reaching 50 million tons in 2006, aquaculture currently accounts for about 45 per cent of all fish consumed by humans, and it is expected to overtake capture fisheries as the main source of food fish supply in the near future. Seventy-nine per cent of world production of fish and fishery products (capture and aquaculture) takes place in developing countries and half of global fish exports of $86 billion in 2006 originated in developing countries. As an important source of protein, fatty acids, vitamins and minerals, fish consumption helps reduce hunger and malnutrition. Fish farming improves food security by creating jobs and raising incomes. It is estimated that in Asia, fish farming directly employs some 12 million people. Africa has lagged behind in the fish boom, however, as it is the only region where per capita fish consumption has fallen and whose share of global aquaculture production is less than 1 per cent. FAO has projected that by 2030 an additional 37 million tons of fish per year will be needed to maintain current levels of fish consumption for an expanding world population. Because traditional capture fisheries have reached their maximum production levels, fish farming remains the only way to fill this "fish gap".[7]

2. Changing patterns of consumption

14. Diets in developing countries, in particular, are changing as incomes rise. The share of staples, such as cereals, roots and tubers, is declining, while that of meat, dairy products and oilseeds is rising. Cereals are still by far the world's most important sources of food, both for direct human consumption and indirectly, as inputs to livestock production. But meat and dairy products are expected to provide

[5] FAO, SOFA, 2007, pp. 120-124; and FAO, Food Outlook-Global Market Analysis, November 2007; 2008 forecasts from: FAO, "Crop Prospects and Food Situation", No. 1, February 2008.

[6] FAO, SOFA, 2007; and FAO, Food Outlook-Global Market Analysis, November 2007.

[7] FAO, "The Role of Aquaculture in Sustainable Development", Special Event at the FAO Conference, Rome, 17-24 November 2007.

an increasing share of the human diet. Demand for higher-value commodities, such as fresh fruits and vegetables, horticulture and organic crops, is rising in developed and transition countries and in the developing countries with fast-growing economies.

15. Organic agriculture, which eliminates the use of any chemical inputs such as fertilizers, is practiced on about 2 per cent of the world's farmlands, or nearly 31 million hectares. It is a high-value industry, generating sales of $24 billion in Europe, North America and Asia in 2006, though its potential for expansion in less-developed areas is limited by the need for extensive investment in capacity-building, marketing and high quality control. Experts conclude that, while providing wholesome, nutritious food and a growing source of income for both developed and many developing countries, organic agriculture alone cannot feed the hungry today or in the future.[8]

16. Half the world's population now live in cities, raising the demand in urban areas for all kinds of food, including fresh fruits and vegetables. "Urban agriculture" has developed as individual households garden on small plots, roadsides, terraces and patios, both to feed their families and also to sell through street vendors. By providing fruits and vegetables, urban farmers also contribute to improved nutrition. However, in some cases, the uncontrolled uses of agro-chemicals and doubtful irrigation water have caused public health problems.

3. Tighter supplies and rising prices

17. An analysis of the data for the past 40 years up through the beginning of this decade shows that per capita food consumption has steadily increased, particularly in developing countries (though less so for sub-Saharan Africa), while food prices have declined. The real prices of rice, wheat and maize, the world's major cereal staples, fell by around 60 per cent between 1960 and 2000. But more recently, as a result of poor harvests in key producing countries in 2006-2007 and a fast-growing demand for grains and other crops used for biofuels, world agricultural prices have risen sharply for nearly all major food and feed commodities. This price boom, led by wheat and maize but encompassing almost all other commodities, has been accompanied by much higher market volatility than in the past. In December 2007, FAO reported that cereal prices had reached levels not seen for a decade. Nevertheless, the effect of currency exchange rate swings, in particular the depreciation of the US dollar against all major currencies, has lessened the full impact of rising agricultural prices and kept import demand up.[9]

18. A report prepared by the International Food Policy Research Institute in December 2007 for the annual meeting of the Consultative Group on International Agricultural Research found that rising food prices are, in fact, threatening the livelihoods and nutrition of the poor. The report concludes that surging demand for feed, food and fuel have recently led to drastic price increases, which are not likely to fall in the foreseeable future, due to low stocks and slow-growing supplies of agricultural outputs.[10] While farmers around the world are sharing in some of the

[8] FAO, SOFA, 2007 and World Bank, WDR, 2008 (2007).

[9] FAO, SOFA, 2007, p. 124: Food Outlook-Global Market Analysis, Rome, November 2007; FAO, Food Outlook, Rome, December 2007.

[10] International Food Policy Research Institute, "The World Food Situation: New Driving Forces and Required Actions", report for CGIAR Annual General Meeting, Beijing, 4 December 2007.

benefits of higher prices for their crops, overall the higher retail prices of basic items, a phenomenon called "food inflation", can be said to have the most negative impact on the poorest consumers, who are net food buyers. Reports emerged in late 2007 of protests and civil unrest in a number of countries in Africa and Latin America over surging prices of food staples such as bread, pasta and tortillas, while stocks of rice, which feeds half the world's population, fell to their lowest level since the mid-1970s. Rising prices and reduced stocks, along with higher transport and energy costs, are also reflected in the fact that global food aid deliveries in 2006 fell to their lowest level in over 30 years. The World Food Programme has noted that because of high world prices for grains and transportation, its overall cost to feed a hungry person has gone up 50 per cent in the last five years.[11]

4. Climate change and agriculture

19. Agricultural production could be particularly affected by global warming and climate change. Some analysts project that world agricultural GDP will decrease by 16 per cent by 2020 due to global warming, with the most severe effects in developing countries.[12] The Intergovernmental Panel on Climate Change concluded in its Working Group II report on Impacts, Adaptation and Vulnerability (April 2007) that in many African countries and regions, agricultural production, including access to food, is projected to be severely compromised by climate variability and change.[13]

20. The projected rise in average global temperature over the next 50 years could have serious implications for rainfall and the frequency and intensity of extreme weather events.[14] Countries suffering from food insecurity and fragile environments are particularly vulnerable due to implications for food production, including effects on crops, pastures, forests and livestock, shifting climatic zones, impacts on soils, loss of habitats of harvested and wild species used for food and livelihoods, as well as increased incidence and risks of pests and vector-borne diseases. These countries are also most lacking in capacity to invest in research or infrastructure to mitigate climate change effects or compensate through greater food imports.[15] The triple threat of climate change, rising food prices and population growth impacts most negatively on Africa's rural poor.

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[11] Reported in International Food and Information System, Food Aid Flows, June 2007. A new and positive development has been the increase in food aid originating in developing countries themselves, which rose (albeit from a low level) by 40 per cent in 2006 as a result of high prices and transport costs from traditional donors. WFP, Food Aid Flows, 2006 (Rome, 2007).

[12] Cline, W. R., Global Warming and Agriculture: Impact estimates by country. Washington, D.C., Center for Global Development and Peterson Institute for International Economics, 2007.

[13] IPCC, Climate Change 2007: Impacts, Adaptation and Vulnerability. Summary for Policymakers approved at the eighth Session of Working Group II of the IPCC, Brussels, April 2007. The Final Synthesis Report of the IPCC's 4th Assessment Report is available at: http://www.ipcc.ch/ipccreports/ar4-syr.htm.

[14] Stern, Nicholas, *Stern Review: Economics of Climate Change*, London, United Kingdom Treasury, 2006.

[15] See http://www.iiasa.ac.at/Research/LUC/SAEZ/index.html for further details of a joint FAO and International Institute for Applied Systems Analysis (IIASA) study of a global agro-ecological assessment for agriculture in the 21st century. Also see a subsequent report by IIASA called "Climate change and agricultural vulnerability" is at: http://www.iiasa.ac.at/Research/LUC/JB-Report.pdf.

5. Future prospects

21. Data indicate that the rate of growth in world demand for agricultural products has slowed, because population growth rates have declined and fairly high levels of food consumption have been reached in many countries. Overall, growth in demand is expected to slow still further in the future.[16] However, the poorest developing countries will become more dependent on agricultural imports, and food security in many poor areas will not improve without substantial increases in local production.

22. Globally, producers have satisfied effective market demand in the past for those with the ability to pay. But effective demand does not represent the total need for food and other agricultural products, because hundreds of millions of people lack the money to buy what they need or the resources to produce it themselves. Thus, even if there is sufficient potential for production in the world as a whole, there will still be problems of food security at the household or national level. In urban areas, food insecurity usually reflects low incomes, but in poor rural areas it is often inseparable from problems affecting food production. In many areas of the developing world, the majority of people still depend on local agriculture for food and/or livelihoods but the potential of local resources to support further increases in production is very limited, at least under existing technological conditions.

C. Integrated planning of sustainable agriculture

1. Arable land, soil productivity and crop yields

23. Approximately 11 per cent (1.5 billion hectares) of the Earth's land surface is currently used in crop production (arable land and land under permanent crops, 2003-2005 average). This area represents slightly over one third of the land estimated to be to some degree suitable for growing crops. There are large tracts of land (about 2.7 billion hectares) with varying degrees of agricultural potential in several countries, most of them in sub-Saharan Africa and Latin America, but most of this land lacks infrastructure, or needs to be protected for forest cover and environmental reasons or lacks access to appropriate agricultural and technological inputs.

24. There are three main sources of growth in crop production: expanding the land area, increasing the frequency with which it is cropped (often through irrigation), and boosting yields. Studies show that about 80 per cent of the projected growth in crop production in developing countries will come from intensification in the form either of yield increases (67 per cent) or higher cropping intensities (12 per cent). The share due to intensification is forecast to rise to 90 per cent and higher in the land-scarce regions of the Near East, North Africa and South Asia. In these regions, intensification through improved management and technologies will be the main, indeed virtually the only, source of production growth. Elsewhere, arable land expansion will remain an important factor in crop production growth in many countries of sub-Saharan Africa and Latin America.

[16] World Bank, *WDR, 2008*, based on: Rosegrant, Mark W., et al., "Future Scenarios for Agriculture: Plausible Futures to 2030 and Key Trends in Agricultural Growth", 2006, Background paper for *WDR 2008*.

25. The enhancement and rehabilitation of land resources to achieve sustainable agriculture and the remediation of productivity decline requires a multi-faceted, integrated approach. One such approach is a concept of improved practices called "conservation agriculture", based on the three principles of minimal soil disturbance, permanent soil cover and crop rotation.[17]

2. Fertilizer consumption and energy use

26. The improvement and maintenance of soil fertility is a prerequisite for achieving sustained increases in crop yields. Without adequate levels of soil fertility, crops cannot respond to other inputs such as new seeds and management practices. Most soils must receive sufficient levels of nutrients as organic or inorganic (mineral) fertilizers. A third of the increase in world cereal production in the 1970s and 1980s has been attributed to increased fertilizer use. In India, this figure rises to half. The level of fertilizer use varies enormously from region to region. North America, Western Europe and East and South Asia accounted for over three quarters of world fertilizer consumption in 2007-2008, while fertilizer use in Africa amounted to only 3.4 per cent of the global total.[18]

27. World fertilizer consumption grew rapidly from the 1960s to the 1980s, but slowed considerably in the 1990s. The slowdown in industrial countries was mainly due to reduced Government support for agriculture and increased concern over the environmental impact of inorganic fertilizer. In transition countries, fertilizer consumption also fell rapidly, but for different reasons, namely recession and restructuring. Even in developing countries, the growth rate of fertilizer use in the 1990s was less than half of that in earlier decades.

28. Small shareholders may not now be able to afford fertilizers, as the price has been driven up by rising energy costs and the depletion of phosphate stocks.[19] Although the excessive use of fertilizers and other chemical inputs has for years led to environmental and health concerns, low fertilizer use in sub-Saharan Africa is seen by some analysts as one of the major constraints which has limited its agricultural productivity. On the other hand, some researchers have concluded that, under certain conditions, compost from household and farm waste in some parts of Africa has been more effective in raising smallholder farmers' crop yields than chemical fertilizers.[20] On balance, it appears that an integrated approach to farming, combining improved seeds, the judicious use of fertilizers, plant and soil protection measures and good management practices, is required to produce enough food to feed the growing world population.

29. A recent successful case study that has received widespread attention is the experience of the Government of Malawi which, contrary to the advice of donors and international financial organizations, decided in 2006 to heavily subsidize fertilizer and, to a lesser extent, seed, for its farmers. Luckily timed to the onset of

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[17] Data in this section from FAO, *SOFA, 2007*, table A2. For more information on "Conservation Agriculture", including case studies and best practices, see: http://www.fao.org/ag/ca.

[18] FAO, Current World Fertilizer Trends and Outlook to 2011-2012 (Rome, FAO, February 2008).

[19] UNEP, *Global Environment Outlook (GEO 4)*, 2007.

[20] The pro-fertilizer view is from: World Bank, *WDR 2008*. The argument for organic soil supplements is by Egziabher, Tewolde Berhan Gebre, "Potential of the African Environment for the Intensification of Agricultural Production" in: Aksel Naerstad, ed., *Africa Can Feed Itself* (Oslo, The Development Fund), 2007.

good rains (after several years of drought), corn yields in Malawi more than doubled between 2005-2006 and increased again in 2007. Once a country on the brink of famine, Malawi is now not only feeding itself but also selling corn to the World Food Programme and exporting hundreds of thousands of tons of corn to neighbouring countries in Africa.[21]

30. Biofuels (e.g., ethanol derived from sugar and maize and biodiesel from rapeseed, soybean, palm oil and other crops) have rapidly emerged onto the international agenda and are having significant effects in many countries. Some national Governments, both in developing and developed countries, have already launched biofuel development projects and are actively supporting them with tax exemptions, subsidies and consumption mandates. About 90 per cent of global ethanol production of 40 billion litres in 2006 took place in Brazil (where production began in the 1930s) and the United States, while France and Germany are major producers of biodiesel. Estimates forecast the share of biofuels in global transport energy production increasing from just over 1 per cent today to some 4-7 per cent (depending on policy scenarios) in 2030.[22] While the industry's potential as a source of income and new markets for farmers, including rural and small-scale farmers, is of great interest, there is also concern over biofuel's possible impact on food security, sustainable agriculture and rural development. Competition and trade-offs for arable land, water and other inputs used for food production, upward pressure on food prices and other socio-economic and environmental costs are among the issues to be assessed.

3. Water and agriculture

31. Agriculture is by far the largest user of global water supplies — accounting for at least 70 per cent of the total. This share will probably increase significantly, given growing water scarcity, which already affects every continent and more than 40 per cent of the people on our planet. By 2025, 1.8 billion people will be living in countries or regions with absolute water scarcity, and two thirds of the world's population could be living under water-stressed conditions. The water scarcity situation is exacerbated by climate change, especially in the driest areas of the world. Agriculture, and particularly irrigation, will become more vulnerable to these changes. It is estimated that 80 per cent of the world's food crises are linked to water and especially to drought.[23]

32. Irrigation is crucial to the world's food supplies. In 1997-1999, irrigated land made up only about one fifth of the total arable area in developing countries but produced two fifths of all crops and close to three fifths of cereals. FAO estimates that there appears to be enough unused irrigable land to meet future needs. Studies suggest a total irrigation potential of some 402 million hectares in developing countries, of which only half are currently in use. However, water resources will be a major factor constraining expansion in South Asia, which will be using 41 per cent

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[21] Keynote Address by H.E. Bingu Wa Mutharika, President of Malawi, to the High-Level Special Event on "Aid for trade and Food Security", FAO, Rome, 21 November 2007. See also "Ending Famine, Simply by Ignoring the Experts" by Celia W. Dugger in *The New York Times*, 2 December 2007.

[22] International Energy Agency (IEA), *World Energy Outlook* 2006, Paris, 2006.

[23] Input from FAO for CSD-16; also: UNEP, GEO-4, p. 121; Rosegrant, Mark et al., *World Water and Food to 2025: Dealing with Scarcity* (Washington, D.C., IFPRI, 2002); and OECD, *Water and Agriculture: Sustainability, Markets and Policies* (Paris, OECD, 2006).

of its renewable freshwater resources by 2030, and in the Near East and North Africa, which will be using 58 per cent.

33. Today only 7 per cent of Africa's arable land area is irrigated and this figure is 4 per cent in sub-Saharan Africa. As a result, sub-Saharan Africa uses less than 3 per cent of its water resources. Given that one third of the population of sub-Saharan Africa is undernourished and that its current population of 700 million is expected to reach 1.2 billion in 2030, the opportunities for improving the livelihoods and food security of rural communities through better water management are evident.

4. Plant and animal genetic resources

34. Plant genetic resources for food and agriculture are essential to sustainable agriculture and food security. Humans have used some 10,000 plant species for food throughout history. However, now only 20 crops provide 90 per cent of dietary energy or protein. Wheat, rice and maize alone provide more than half of the global plant-derived energy intake.

35. Plant genetic resources for food and agriculture includes the diversity of genetic material contained in traditional varieties and modern cultivars grown by farmers as well as wild plant species that can be used as food and as feed for domestic animals, and as fibre for clothing, shelter, wood, timber and fuel. Modern agriculture has led farmers to largely abandon their heterogeneous traditional crop varieties in favour of modern and improved, but often uniform varieties. Although much diversity has been conserved in genebanks (ex situ), the erosion of crop diversity resources in the field (in situ) poses a serious threat to the world's food security in the long term. The research centres of the Consultative Group on International Agricultural Research maintain over 600,000 samples of crop, forage and agroforestry genetic resources, available in the public domain. Its seed collections have helped in the recovery of agricultural growth in a number of countries emerging from conflict or following natural disasters such as hurricanes or floods.[24]

36. An issue of considerable controversy in plant breeding is the role of genetically modified organisms. Genetic modification can bring potential (and real) benefits of increasing yields, reducing growing time and improving resistance to disease and pests, which can improve crop production, reducing hunger and creating income for farmers. At the same time, its risks to the environment, including biological diversity, and to human and animal health are largely unknown. Recently arguments have been made for and against genetically modified organisms in the discussions to launch a new green revolution for Africa. Proponents say that Africa must use all available technologies, both conventional and modern biotechnology, to address the challenges facing agriculture, while opponents believe Africa can achieve food security without using genetically modified organisms. Many conclude

[24] More information available at: www.cgiar.org.

that it is not an either/or situation and new technologies should be part of the toolbox of possible solutions.[25]

37. Animal genetic resources used for food and agriculture have also eroded at an accelerated rate in recent years. The *State of the World's Animal Genetic Resources for Food and Agriculture*, published by FAO in 2007, identifies significant gaps in the capacities of countries, particularly developing countries, to manage animal genetic resources in an integrated manner.[26]

5. Animal and human health

38. The introduction of synthetic pesticides (insecticides, fungicides and herbicides) over the past 60 years has changed the role of pest control as part of agricultural intensification. Pesticide use remains the highest in developed countries, but these markets are stagnating or contracting, partly because of strong environmental concerns in several countries. The integrated pest management approach has become the preferred pest control strategy. Integrated pest management is the careful integration of a number of available pest control techniques that discourage the development of pest populations and keep pesticides and other interventions to levels that are economically justified and safe for human health and the environment. Integrated pest management emphasizes the growth of a healthy crop with the least possible disruption of agroecosystems, thereby encouraging natural pest control mechanisms. It is estimated by FAO that integrated pest management can reduce pesticide use by 50 per cent for cotton and vegetable production and up to 100 per cent in the case of rice.

39. Environmental changes, human and animal demographic patterns and changes in farming practices have also been associated with a growing incidence of animal-to-human disease transmission. Some recent cases of known animal-to-human (e.g., zoonotic) diseases include Severe Acute Respiratory Syndrome, avian influenza, and bovine spongiform encephalopathy. As many infectious diseases are zoonotic, FAO, the World Organization for Animal Health and the World Health Organization (WHO) combined and coordinated their alert and response mechanisms in 2006 in the joint Global Early Warning and Response System in order to improve containment and control of major animal diseases.

40. The joint FAO/WHO Codex Alimentarius Commission has contributed significantly to the international harmonization of food safety and quality. Since its foundation almost 50 years ago, the Commission has adopted close to 300 standards on commodities and food safety issues, over 3,000 maximum limits for pesticide residues and veterinary drugs, over 1,000 food additives provisions, dozens of guidelines for contaminants as well as codes of practice to prevent contamination and various texts on food hygiene which have become global benchmarks.

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[25] The debate recently arose over a presentation by the newly established (Sept. 2006) Alliance for a Green Revolution in Africa (AGRA) over whether AGRA would incorporate GMOs in its initial strategy. The conclusion finally reached was that AGRA was not against the use of GMOs but would mainly rely on conventional crops because they could generate quick successes and fit within the framework of African countries. See additional discussion and comments at: http://www.bdafrica.com.

[26] FAO, 2007, *The State of the World's Animal Genetic Resources for Food and Agriculture*, Rome (http://www.fao.org/docrep/010/a1250e/a1250e00.htm).

D. Means of implementation: international trade and investment in agriculture

1. International agricultural trade

41. The past several decades have witnessed a dramatic increase in the integration of the world economy through trade. International trade in agricultural products (including crops, livestock, forestry and fisheries products) has also expanded more rapidly than global agricultural GDP, although at lower rates than for overall trade in goods and services and overall GDP. While agricultural trade has continued to expand over the past 40 years (data through 2003) to approximately $725 billion, its share in total merchandise trade has steadily declined from close to one third four decades ago to around 10 per cent in 2003.[27]

42. During this period, the role of agricultural trade in overall trade patterns has changed as the net flow of agricultural commodities between developed and developing countries has reversed direction. Over the past four decades, the developing countries have seen a major decline in the share of agricultural exports in their total merchandise exports, together with a slower decline in the share of agriculture in their total imports. They have moved from a positive net agricultural trade position, with exports exceeding imports by a significant proportion, to a situation in which agricultural imports and exports have been roughly balanced in recent years. Developed countries have seen their share of both agricultural exports and imports decline more slowly over the same period. Today, for both developed and developing countries, agricultural trade is roughly balanced and corresponds to around 10 per cent of their total merchandise imports.[28]

43. Cereal products, which had comprised the largest share of international agricultural trade, now account for less than 50 per cent in developing countries and less than one third in developed countries, as both groups are now importing more higher-value and processed foods, including edible oils, livestock products and fruits and vegetables.[29]

44. The least developed countries represent a particular case in terms of long-term trends in global agricultural trade. The agricultural exports of this group of countries have declined dramatically as a share of their overall exports, while agricultural imports have consistently represented around 25 per cent of their total imports. The least developed countries have moved from a position of net agricultural exporters to one of net agricultural importers, and since the late 1980s their agricultural trade deficit has widened rapidly. At the same time, the least developed countries account for a very low degree of integration of their agriculture sector into world markets compared with the developing countries overall. African countries spent an estimated $18.7 billion on food imports in 2000, while the value of agricultural exports amounted to $14 billion, only slightly above the 1990 figure.

45. The impact of trade policy on poverty, food security and inequality in developing countries is at the centre of an intense international debate on the role of

[27] FAO, *The State of Food and Agriculture, 2005*, special chapter on "Agriculture, Trade and Poverty: can trade work for the poor?", Rome, 2005.

[28] FAO, FAOSTAT Statistical Database, Rome, 2006 (http://faostat.fao.org).

[29] For a detailed review of agricultural trade, including projections to 2016, see: OECD and FAO, *OECD-FAO Agricultural Outlook, 2007-2016* (Paris and Rome, 2007), pp. 37-46 and tables.

international trade in development. The current Doha Round of trade negotiations makes development and poverty a top priority. While agricultural trade can contribute to an agriculture-based development strategy and the liberalization of trade in agricultural products can have beneficial effects, it is not clear if increased openness to international trade will, on its own, lead to major improvements in economic growth, poverty reduction or food security. Much of the debate in the Doha Round involves improved market access to the developed economies for developing countries' agricultural exports and limiting developed countries' domestic farm-support programmes from placing subsidized commodities on world markets to the detriment of developing country producers.

2. Investment in agriculture

46. Financial investments in the agricultural sector, as in other sectors, can consist of public resource flows, such as official development assistance (grants and concessional funds from donor countries and multilaterals), non-concessional loans by the international financial institutions, private sector external resource flows, private foundation grants and domestic resources, both public and private. Insufficient investment from all these sources over several decades is seen as a major constraint to increasing agricultural production.

47. Over the past 20-25 years, official development assistance to agriculture declined sharply, both as a share of all official development assistance and in absolute terms. The share of agriculture in official development assistance fell from a high of about 18 per cent in 1979 to 3.5 per cent in 2004, while the volume of agricultural official development assistance fell from its high of about $8 billion in 1984 (in 2004 $) to $3.4 billion in 2004. Total official development assistance to agriculture in Africa (both sub-Saharan and North Africa) increased somewhat in the 1980s, but by 2004 had fallen back to its 1975 level of about $1.2 billion.[30]

48. More recently, total official development assistance increased significantly in 2005 (following donor commitments made at the 2002 International Conference on Financing for Development), but the big increase in aid to Africa, especially sub-Saharan Africa, was for debt forgiveness grants to a few large countries. While lending to agriculture by multilateral organizations increased by about 30 per cent in 2003-2005, this was from a very low level, following the steep decline in total lending (especially the World Bank) to agriculture in the 1990s.[31] More recently, the World Bank announced that its investments in agriculture and rural development increased in fiscal year 2007 for the fourth straight year, reaching $3.1 billion, or 12 per cent of total Bank lending. The bulk of this went to South Asia, followed by sub-Saharan Africa.

49. Total official development assistance flows from the major donor countries in 2006 fell by 4.5 per cent to $104.4 billion.[32] Thus, if the share of official development assistance to agriculture that year (data not yet available) remained

[30] OECD, *Credit Reporting System, 2006*. Paris, Organization for Economic Cooperation and Development (OECD); and World Bank, *WDR, 2008 (2007)*.

[31] World Bank, *WDR 2008* and FAO, "Financing of Agriculture: Issues, Constraints and Perspectives", document C 2007/INF/18 prepared for the thirty-fourth session of the FAO Conference, Rome, 17-24 November 2007.

[32] OECD/DAC, *Final ODA Flows in 2006*, released 10 December 2007, Paris. The DAC is the Development Assistance Committee of the OECD.

about the same as in 2004, the absolute volume of aid would fall even further. The World Bank (which is now seeking to increase multilateral investments in agriculture and rural development) has identified several reasons for the decline of donor support to these sectors — which it calls "agroskepticism": (a) falling international commodity prices that made agriculture less profitable in developing countries; (b) increased competition within official development assistance especially from social sectors; (c) emergency responses to numerous crises; (d) opposition from farmers in some donor countries to supporting agriculture in their major export markets; and (e) opposition from environmental groups that saw agriculture as a contributor to natural resource destruction and environmental pollution.[33]

50. Domestic public expenditures by countries in their agricultural sectors have also declined as a share of total public spending, from 11.3 per cent in 1980 to 6.7 per cent in 2002. Recent data indicate that for "agriculture-based countries" (14, of which 12 are in sub-Saharan Africa), the share of public spending on agriculture amounted to about 4 per cent in 2004, down from 6.9 per cent in 1980.[34] The share of agriculture spending in Latin America and the Caribbean has declined even further, perhaps to 2.5 per cent of total public expenditures in 2002 (from 8.0 per cent in 1980).[35] The decrease in public expenditures on agriculture contrasts with spending on education and health, which has increased in all regions.

51. Concern by African countries themselves at the continuing decline in their domestic public resources devoted to agriculture led to the important commitments by African Heads of State and Government undertaken in the Maputo Declaration of 2003 and the adoption at the same time of the Comprehensive Africa Agriculture Development Programme. The Development Programme, which was prepared by the New Partnership for Africa's Development, addresses issues of growth in the agricultural sector, rural development and food security. The Maputo Declaration committed member States of the African Union, inter alia, to implement as a matter of urgency the Development Programme vision for Africa's agriculture (including a 6 per cent annual growth in food production by 2015), and to allocate at least 10 per cent of national budgetary resources within five years (i.e., by 2008-2009) towards agriculture and rural development.[36]

52. These public commitments, along with the agreements contained in the Millennium Development Goals, the 2002 Monterrey Consensus on Financing for Development and the G-8 Summit in Gleneagles, Scotland, in 2005, have been bolstered in recent years by very significant sources of development funding from private foundations. In particular, in 2006 the Rockefeller Foundation, which is known for its key role in supporting the green revolution in the 1950s-1970s, which transformed agriculture in South and South-East Asia and Latin America, teamed up

[33] World Bank, *WDR 2008* (2007).

[34] Fan, Shenggen, *Public Expenditures, Growth and Poverty in Developing Countries: Issues, Methods and Findings* (Baltimore, Maryland, Johns Hopkins University Press) Forthcoming, cited in World Bank, *WDR 2008* (2007).

[35] Stephen Ackroyd and Lawrence Smith, *Review of Public Spending to Agriculture*, OPM, January 2007, cited in: FAO, "Financing of Agriculture: Issues, Constraints and Perspectives", document C 2007/INF/18 prepared for the thirty-fourth session of the FAO Conference, Rome, 17-24 November 2007.

[36] See "NEPAD's CAADP", in *Catalyst for Action: Towards an African Green Revolution*, Report of the Oslo Conference 2006 (Oslo, Yara International ASA), 2007.

with another United States-based non-governmental organization, the Bill and Melinda Gates Foundation, to invest $150 million to launch the Alliance for a Green Revolution in Africa. The long-term partnership seeks to improve agricultural development in Africa by addressing both farming and relevant socio-economic and environmental issues, including soil fertility and irrigation, availability of high-quality and affordable seeds and other improved inputs, farmer management practices, and farmer access to markets and financing.[37]

III. Continuing challenges

53. With the global population projected to grow to 9 billion people by 2050 which is 50 per cent more than today, mostly in the developing world, the pressure on agriculture to feed and sustain these numbers requires innovative solutions. There is no guarantee that agriculture's remarkable success over the past half century will persist, in light of the new challenges and conditions that are prevailing. A 2005 study by the World Bank concluded that, for better or for worse, the agricultural context in many developing countries is far different from what it was even a decade ago.[38] But, even if different, the World Bank's 2007 report on agriculture notes that in the twenty-first century, agriculture continues to be a fundamental instrument for sustainable development and poverty reduction.[39]

54. The renewed focus on agriculture exemplified in recent years by Governments, international organizations and public and private initiatives, such as described in part II above, is encouraging. Improved economic performance in developed countries and in many developing countries promises more rapid advances in hunger and poverty alleviation in the coming years. Still, the task ahead is daunting; each year until 2015, the world must be able to count 31 million fewer hungry people if the goals agreed by the World Food Summit and reaffirmed by the World Summit on Sustainable Development and the Millennium Declaration are to be met. Furthermore, not all countries face equal challenges, and many risk being left behind in the fight against hunger. Those that face the most serious difficulties and need to make the largest efforts are often those that have the least means to do so.

55. Today, world agriculture is called upon to play a variety of roles, in which the trade-offs are considerable and often difficult. While guaranteeing food security for the global population and a source of livelihood for billions of people, particularly the poor, it must also provide ecosystem services to the wider environment, serve as a sink for carbon sequestration and manage and use soil, water, energy and other natural resources efficiently and sustainably, all while minimizing environmental damage. Major uncertainties underlie future developments, including increasing resource scarcity, especially of water, but also of arable land; risks from climate change; higher energy prices; and new market demands, for example, for biofuels.

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[37] The Rockefeller Foundation, *Press Release* dated 12 September 2006, quotes Mr. Gates, the Co-Chair of the Gates Foundation at the launch of AGRA as remarking: "No major region around the world has been able to make sustained economic gains without first making significant improvements in agricultural productivity".

[38] World Bank, *Agricultural Growth for the Poor: An Agenda for Development* (Washington, D.C., 2005).

[39] World Bank, *WDR 2008*.

Added to this is the recent drastic rise in world food prices that threatens the poorest.

56. Particularly in Africa, the challenges of poverty, agriculture and the environment are intertwined and demanding. Food security in Africa has substantially worsened over the past decades and expensive food imports have increased. International food aid flows to cover emergency, relief and recovery operations continue to be essential. Of the 36 countries in crisis currently identified by FAO as requiring external assistance to deal with critical food insecurity, 21 are in Africa.[40]

57. Nevertheless, despite these challenges, recent examples of production gains and rising rural incomes, together with a new determination on the part of developing countries and support from the international community, have led a number of observers to conclude that Africa can feed itself and at the same time preserve the environment and its natural resources.[41] In these efforts, the role of farmers and other rural stakeholders is critical. After years of neglect by donors and national Governments, attention is again focusing on the need to invest in agriculture and small-scale farmers to reduce poverty and hunger, to increase rural development and food security and to promote a sustainable alternative to urban migration. The important role that women farmers play in small-scale agriculture, in particular, requires that gender concerns are integrated into these efforts.

[40] FAO, "Crop Prospects and Food Situation", No. 1, February 2008, Rome. The other "countries in crisis" are in Asia (9), Latin America and the Caribbean (4) and Europe (2).

[41] See Aksel Naerstad, ed., *Africa Can Feed Itself: Conclusions and recommendations from the Conference "Can Africa Feed Itself?"*, Oslo, 6-8 June 2007.